JOURNAL OF GEOPHYSICAL RESEARCH, VOL. 114, B04299, doi:10.1029/2009JB006451, 2009

Correction to "Elastic wave speeds and moduli in polycrystalline ice Ih, sI methane hydrate, and sII methane-ethane hydrate"

M. B. Helgerud, W. F. Waite, S. H. Kirby, and A. Nur

Received 10 March 2009; published 10 April 2009.

Citation: Helgerud, M. B., W. F. Waite, S. H. Kirby, and A. Nur (2009), Correction to ''Elastic wave speeds and moduli in polycrystalline ice Ih, sI methane hydrate, and sII methane-ethane hydrate,'' *J. Geophys. Res., 114,* B04299, doi:10.1029/2009JB006451.

[1] In the paper "Elastic wave speeds and moduli in polycrystalline ice Ih, sI methane hydrate, and sII methane-ethane hydrate" by M. B. Helgerud, W. F. Waite, S. H. Kirby, and A. Nur (*Journal of Geophysical Research, 114*, B02212, doi:10.1029/2008JB006132, 2009), the mathematical formula listed in Tables 1–3, and A1 is incorrect. The correct headings are given here.

Table 1. Regressions of V_p and V_s, ν, and M, G, and K Versus Temperature and Piston Pressure for Compacted, Polycrystalline Ice Ih[a]

	$F(T,P) = aT + bP + c$			
	a[b]	b[b]	c[b]	Uncertainty[c]
V_p (m s^{-1})	-2.67 ± 0.05	0.2 ± 0.08	3864 ± 2	±1.5
V_s (m s^{-1})	-1.244 ± 0.005	-0.198 ± 0.007	1942.4 ± 0.2	±1.5
ν	$-(2.0 \pm 0.6) \times 10^{-5}$	$(6.8 \pm 0.9) \times 10^{-5}$	0.3310 ± 0.0002	±3
M (GPa)	$-(2.15 \pm 0.04) \times 10^{-2}$	$(4.02 \pm 0.03) \times 10^{-3}$	13.69 ± 0.02	±4
G (GPa)	$-(5.03 \pm 0.02) \times 10^{-3}$	$-(3.0 \pm 0.2) \times 10^{-4}$	3.459 ± 0.0007	±4
K (GPa)	$-(1.48 \pm 0.04) \times 10^{-2}$	$(3.4 \pm 0.5) \times 10^{-3}$	9.07 ± 0.02	±6

[a]V_p, compressional wave speeds; V_s, shear wave speeds; ν, Poisson's ratio; M, dynamic compressional wave; G, shear moduli; and K, bulk moduli; temperature of −20 to −5°C; and piston pressure of 22.4 to 32.8 MPa. Calculated density range was 0.920 to 0.923 g cm^{-3}.
[b]Units for a are the units of the property being fit divided by °C. Units for b are those of the property being fit divided by MPa. Units for c are those of the property being fit.
[c]Uncertainty is given as a percentage of the property being fit.

Table 2. Regressions of V_p and V_s, ν, and M, G, and K Versus Temperature and Piston Pressure for Compacted, sI Methane Hydrate[a]

	$F(T,P) = aT + bP + c$			
	a[b]	b[b]	c[b]	Uncertainty[c]
V_p (m s^{-1})	-1.84 ± 0.03	0.31 ± 0.02	3766 ± 2	±1.5
V_s (m s^{-1})	-0.892 ± 0.005	-0.100 ± 0.003	1957.0 ± 0.2	±1.5
ν	$-(9 \pm 4) \times 10^{-5}$	$(6.6 \pm 0.3) \times 10^{-5}$	0.3151 ± 0.0002	±3
M (GPa)	$-(1.64 \pm 0.02) \times 10^{-2}$	$(4.02 \pm 0.03) \times 10^{-3}$	13.11 ± 0.01	±4
G (GPa)	$-(4.2 \pm 0.02) \times 10^{-3}$	$(9 \pm 1) \times 10^{-5}$	3.541 ± 0.0008	±4
K (GPa)	$-(1.09 \pm 0.02) \times 10^{-2}$	$(3.8 \pm 0.2) \times 10^{-3}$	8.39 ± 0.01	±6

[a]Same as Table 1 except temperature of −20 to 15°C and piston pressure of 30.5 to 97.7 MPa. Calculated density range was 0.924 to 0.933 g cm^{-3}.
[b]Units for a are the units of the property being fit divided by °C. Units for b are those of the property being fit divided by MPa. Units for c are those of the property being fit.
[c]Uncertainty is given as a percentage of the property being fit.

0148-0227/09/2009JB006451$09.00

Table 3. Regressions of V_p and V_s, ν, and M, G, and K Versus Temperature and Piston Pressure for Compacted, Polycrystalline sII Methane-Ethane Hydrate[a]

	$F(T,P) = aT + bP + c$			
	a[b]	b[b]	c[b]	Uncertainty[c]
V_p (m s^{-1})	-1.825 ± 0.008	$(3.10 \pm 0.05) \times 10^{-1}$	3821.8 ± 0.3	1.5
V_s (m s^{-1})	-0.894 ± 0.002	$-(0.87 \pm 0.01) \times 10^{-1}$	2001.14 ± 0.08	1.5
ν	$-(1.4 \pm 0.1) \times 10^{-5}$	$(6.29 \pm 0.07) \times 10^{-5}$	0.31119 ± 0.00004	3
M (GPa)	$-(1.564 \pm 0.005) \times 10^{-2}$	$(4.02 \pm 0.03) \times 10^{-3}$	13.407 ± 0.002	4
G (GPa)	$-(4.021 \pm 0.007) \times 10^{-3}$	$(1.66 \pm 0.04) \times 10^{-4}$	3.6764 ± 0.0003	4
K (GPa)	$-(1.028 \pm 0.005) \times 10^{-2}$	$(3.80 \pm 0.03) \times 10^{-3}$	8.505 ± 0.002	6

[a]Same as Table 1 except temperature of −20 to 10°C and piston pressure of 30.5 to 91.6 MPa. Sample density calculated theoretically as a function of temperature and pressure with 94% cage occupancy, 79.25% methane, 20.75% ethane. Calculated density range was 0.917 to 0.931 g cm^{-3}.
[b]Units for a are the units of the property being fit divided by °C. Units for b are those of the property being fit divided by MPa. Units for c are those of the property being fit.
[c]Uncertainty is given as a percentage of the property being fit.

Table A1. Regressions of Density Versus Temperature for Solid Ice Ih, sI Methane Hydrate, and sII Methane-Ethane Hydrate[a]

	$\rho(T,P) = aT + bP + c$			
Material	a[b]	b[b]	c[b]	Uncertainty[c]
Ice Ih	-1.5035×10^{-4}	1.0594×10^{-4}	0.91673	3
sI methane hydrate	-2.3815×10^{-4}	1.1843×10^{-4}	0.92435	3
sII methane-ethane hydrate	-1.7719×10^{-4}	1.2228×10^{-4}	0.91801	3

[a]Both hydrate structures are assumed to have 94% cage occupancy. The ratio of methane to ethane in the sII hydrate is assumed to be 4:1. Temperature and pressure ranges are given in Tables 1–3.
[b]Units for a are the units of the property being fit divided by °C. Units for b are those of the property being fit divided by MPa. Units for c are those of the property being fit.
[c]Uncertainty is given as a percentage of the property being fit.